

**WHAT IS CLAIMED IS:**

1. A process of producing polyethylene, the process comprising copolymerizing ethylene and an alpha-olefinic comonomer comprising from 3 to 8 carbon atoms in the presence of a chromium-based catalyst in a main polymerization reactor and, in a gas-phase preliminary reactor upstream of the main polymerization reactor, chemically treating the chromium-based catalyst with at least one treatment agent prior to introduction of the catalyst into the main polymerization reactor and releasing from the preliminary reactor waste gases produced during the chemical treatment.
2. A process according to claim 1 wherein the chemical treatment comprises chemical reduction of the chromium-based catalyst by the at least one treatment agent.
3. A process according to claim 2 wherein the treatment agent comprises at least one hydrocarbon.
4. A process according to claim 1 wherein the chemical treatment includes removal of at least one adsorbed species on the catalyst.

5. A process according to claim 4 wherein the adsorbed species comprises carbon monoxide which has remained on the catalyst following a previous step of chemically reducing the chromium-based catalyst with carbon monoxide.

6. A process according to claim 1 wherein the at least one treatment agent comprises ethylene.

7. A process according to claim 6 wherein the ethylene is pre polymerized in the preliminary reactor.

8. A process according to claim 1 wherein the main polymerization reactor comprises a first main reactor and a second main reactor serially connected thereto.

9. A process according to claim 8 wherein polyethylene copolymer is produced in both of the first and second main reactors.

10. A process according to claim 8 wherein polyethylene copolymer is produced in one of the first and second main reactors and polyethylene homopolymer is produced in the other of the first and second main reactors.

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11. An apparatus for producing polyethylene, the apparatus comprising a main reactor having an inlet for receiving gaseous olefin monomer and an outlet for outputting polyethylene, and a preliminary reactor connected to a second inlet of the main reactor, the preliminary reactor being arranged to be operable in the gas phase and having at least one respective inlet for receiving a solid catalyst and at least one treatment agent and a respective outlet for releasing waste gases from the preliminary reactor.